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SAFETY REQUIREMENTS IN ELECTRO-HEAT INSTALLATIONS

PART II PARTICULAR REQUIREMENTS FOR RESISTANCE HEATING EQUIPMENT

Section 4 Protection in Installations used for Drying Varnishes and other Similar Products

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PART II PARTICULAR REQUIREMENTS FOR RESISTANCE HEATING EQUIPMENT

Section 4 Protection in Installations used for Drying Varnishes and other Similar Products

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SAFETY REQUIREMENTS IN ELECTRO-HEAT INSTALLATIONS

PART II PARTICULAR REQUIREMENTS FOR RESISTANCE HEATING EQUIPMENT

Section 4 Protection in Installations used for Drying Varnishes and other Similar Products

0. FOREWORD

0.1 This Indian Standard (Part II/Sec 4) was adopted by the Indian Standards Institution on 12 January 1981, after the draft finalized by the Industrial Electroheating Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard forms Section 4 of Part II covering the requirements for protection in installations used for drying varnishes and other similar products. The other parts of the series are as follows:

Part I General requirements
Part II Particular requirements for resistance heating equipment
  Sec 1 Protection in direct resistance heating installations
  Sec 2 Protection in indirect resistance heating installations
  Sec 3 Protection in potassium and sodium nitrate and nitrite bath furnaces
Part III Particular requirements for mains and medium frequency induction furnace installations.
Part IV Particular requirements for arc furnace installations.

0.3 In preparing this standard considerable assistance has been derived from IEC Publication 519-2 (1975) ‘ Safety in electro-heat installation: Part II Particular requirements for resistance heating equipment ’ issued by International Electrotechnical Commission.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part II/Sec 4) applies to all drying installations particularly to ovens, where they are used for drying or baking varnishes or other substances, the solvents or diluents of which may form, in contact with air, explosive mixtures.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Drying Ovens with Natural Ventilation — Installation in which the ventilation is ensured only by the ascending movement of hot air.

2.2 Drying Ovens with Forced Ventilation — Installations in which ventilation is ensured by an air circulating fan, by a fan mounted in the air exit duct, or by a fan mounted in the fresh air intake duct.

2.3 Drying Enclosure — Space in a drying oven where the material to be dried is placed.

2.4 Vapour Space — All the space in the oven which can be filled with evaporated solvents.

3. CONSTRUCTION AND INSTALLATION DETAILS

3.1 Nameplates and Wiring Diagram — In addition to the plate indicating the power, the oven shall be provided with a second plate giving the wiring diagram (internal connections) of heating elements. This additional plate can be eliminated if the number of the relevant wiring diagram is already given on the nameplate and if this diagram is fixed not far from the furnace.

3.2 Overheating and Temperature Control — The possibility of local overheating shall be avoided in the oven construction. The oven shall be provided with a temperature controller or at least with an automatic temperature limiting system and also with a temperature indicator.

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*Rules for rounding off numerical values (*revised*).

3.3 Internal Heating Elements

3.3.1 The heating elements shall be so made as to avoid any sparking and if possible shall be metal-clad.

3.3.2 The tubes protecting heating elements shall be gas-tight and made of material resistant to oxidation at the working temperature; their walls shall be at least 0·5 mm thick.

3.3.3 If screwed infrared emitters are applied, care shall be taken that the fittings cannot become unscrewed.

3.4 Internal Connections

3.4.1 The assembly of conducting elements placed inside the enclosure shall be made by welding or hard soldering.

3.4.2 This does not apply to infrared emitters with screwed fittings.

3.5 Ventilation Devices

3.5.1 In order to maintain the concentration of solvent or diluent vapours well below the explosive limit, the vapour space of the oven shall be equipped with a ventilation system (natural or forced).

3.5.2 Throttle valves placed in air ducts in the ventilation system shall not close completely so that satisfactory ventilation is ensured at all times.

3.6 Explosion Panel — All closed drying ovens, that is ovens whose apertures or doors are closed during operation, shall be provided with an explosion panel of suitable dimensions and weight, and of a machanical strength ensuring that, in the case of an explosion, the liberated internal pressure is directed to an area not dangerous to personnel.

4. OPERATION

4.1 For operation and installation of ovens and installations for drying varnishes and similar substances, it is necessary to comply with the requirements of the relevant Indian Standard.

4.2 In the case of ovens with forced ventilation, heating shall not be started before the beginning of the fresh air intake or the air circulation system. Provision should be made to ensure that, when the fresh air intake ceases, all heating elements are switched off.

4.3 Furthermore, equipment shall be provided with danger indicators, at least one of which should be outside the immediate proximity of the dangerous zone.

INDIAN STANDARDS
ON
INDUSTRIAL ELECTRO-HEATING EQUIPMENT

IS:

1885 (Part LI/Sec 1)-1979 Electrotechnical vocabulary: Part LI Industrial electro-heating, Section 1 General terms

1885 (Part LI/Sec 2)-1979 Electrotechnical vocabulary: Part LI Industrial electro-heating, Section 2 Resistance heating

8992-1978 Test methods for induction furnaces with submerged channels

9021-1978 General test conditions for industrial electro-heating equipment

9029-1978 Methods of tests for batch furnaces with metallic heating resistors

9050-1979 Nominal dimensions of cylindrical machined graphite electrodes with threaded sockets and connecting pins for use in electric arc furnaces

9080 (Part I)-1979 Safety requirements in electro-heat installations: Part I General requirements

9080 (Part II/Sec 1)-1979 Safety requirements in electro-heat installations: Part II Particular requirements for resistance heating equipment, Section 1 Protection in direct resistance heating installations

9080 (Part III)-1979 Safety requirements in electro-heat installations: Part III Particular requirements for mains and medium frequency induction furnace installations